

**PLASMA SOUND SOURCE OCEAN TEST  
ENVIRONMENTAL ASSESSMENT  
TABLE OF CONTENTS**

<u>CHAPTER</u>	<u>TITLE</u>	<u>PAGE</u>
<b>EXECUTIVE SUMMARY .....</b>		ES-1
Deployment of the PSS System.....		ES-2
Passive Array Placement .....		ES-2
Operation and Inspection of the System.....		ES-2
Retrieval of the System.....		ES-2
Support Vessels and Personnel.....		ES-2
Selection of the Test Site and Test Period.....		ES-2
Monitoring and Mitigation Measures .....		ES-4
Summary of Impacts .....		ES-6
<b>1 PURPOSE AND NEED .....</b>		1-1
1.1 INTRODUCTION.....		1-1
1.2 PURPOSE AND NEED .....		1-1
1.2.1 Purpose and Need for PSS .....		1-1
1.2.2 Purpose and Need for PSS Ocean Test.....		1-2
1.3 REGULATORY COMPLIANCE.....		1-2
<b>2 PROPOSED ACTION AND ALTERNATIVES .....</b>		2-1
2.1 DESCRIPTION OF THE PROPOSED ACTION .....		2-1
2.1.1 PSS Description.....		2-1
2.1.1.1 Overview .....		2-1
2.1.1.2 General Background of AST and PSS .....		2-1
2.1.2 PSS Ocean Test Description .....		2-1
2.1.2.1 PSS Ocean Test Activities .....		2-1
Deployment of the System .....		2-2
Operation of the System .....		2-2
Test Vessels .....		2-2
Plasma Sound Source .....		2-4
2.2 ALTERNATIVE ANALYSIS .....		2-4
2.2.1 Alternatives to the PSS Ocean Test .....		2-5
2.2.1.1 PSS Ocean test Operational Criteria and Siting Process.....		2-5
2.2.2 PSS Ocean Test Locations.....		2-7
2.2.2.1 Proposed Location .....		2-7
Exclusion Areas.....		2-7
Sea Banks.....		2-7
Known Dump Sites .....		2-8
Known Diver Sites.....		2-8
2.2.3 No-Action Alternative .....		2-8
<b>3 AFFECTED ENVIRONMENT .....</b>		3-1
3.1 AIR QUALITY .....		3-1
3.1.1 Applicable Regulations, Plans, and Policies.....		3-1
3.1.2 Compliance with Air Quality Standards .....		3-1
3.1.3 Sensitive Receptors.....		3-3
3.1.4 Clean Air Act Conformity .....		3-3

## TABLE OF CONTENTS (Cont'd)

<u>CHAPTER</u>	<u>TITLE</u>	<u>PAGE</u>
3.2	MARINE ENVIRONMENT .....	3-3
3.2.1	Background .....	3-3
3.2.2	PSS Ocean Test Locations .....	3-4
3.2.2.1	Proposed PSS Ocean Test Location..... Physical Oceanography..... Water Quality..... Marine Water Characteristics .....	3-4 3-4 3-4
3.2.2.1	Marine Sediments and Bathymetry.....	3-5
3.3	MARINE BIOLOGY .....	3-6
3.3.1	Background .....	3-6
3.3.2	PSS Ocean Test Locations .....	3-6
3.3.2.1	Proposed PSS Ocean Test Location..... Marine Flora .....	3-6 3-6
3.3.2.1	Marine Fauna .....	3-7
3.3.2.1	Nearshore Habitats.....	3-8
3.3.2.1	Threatened an Endangered Species .....	3-9
3.4	MARINE MAMMALS .....	3-9
3.4.1	Background .....	3-9
3.4.2	PSS Ocean Test Location .....	3-10
3.4.2.1	Proposed PSS Ocean Test Location..... Area within Territorial Waters.....	3-10 3-14
3.4.3	Acoustic Issues.....	3-15
3.4.3.1	Call Characteristics and Hearing Abilities..... Odontocetes (Toothed Whales)..... Calls .....	3-15 3-16 3-16
3.4.3.1	Hearing .....	3-17
3.4.3.1	Mysticetes (Baleen Whales) .....	3-17
3.4.3.1	Calls .....	3-17
3.4.3.1	Hearing .....	3-19
3.4.3.1	Pinnipeds (Seals and Sea Lions) .....	3-19
3.4.3.1	Calls .....	3-19
3.4.3.1	Hearing .....	3-20
3.4.3.2	Masking Effects .....	3-20
3.5	TERRESTRIAL BIOLOGY .....	3-21
3.5.1	Background .....	3-21
3.5.2	PSS Ocean Test Locations .....	3-22
3.5.2.1	Proposed PSS Ocean Test Location.....	3-22
3.6	LAND USE, TRANSPORTATION, AND RECREATION.....	3-22
3.6.1	Background .....	3-22
3.6.2	PSS Ocean Test Locations .....	3-23
3.6.2.1	Proposed PSS Ocean Test Location..... Land Use/Recreation .....	3-23 3-23
3.6.2.1	Transportation .....	3-24
3.7	SOCIOECONOMICS.....	3-24
3.7.1	Background .....	3-24
	Executive Order 12898.....	3-25
	Executive Order 13045.....	3-25

## TABLE OF CONTENTS (Cont'd)

<u>CHAPTER</u>	<u>TITLE</u>	<u>PAGE</u>
3.7.2	PSS Ocean Test Locations .....	3-25
3.7.2.1	Proposed PSS Ocean Test Location.....	3-25
	Commercial Shipping.....	3-25
	Commercial Fishing.....	3-25
	Sport Fishing .....	3-26
	Other Recreational Activities/Tourism .....	3-27
	Environmental Justice/Children's Justice .....	3-27
3.8	NOISE .....	3-28
3.8.1	Background .....	3-28
	Noise Terminology.....	3-28
	Airborne Noise Characteristics .....	3-29
	Underwater Noise Characteristics.....	3-29
	Underwater Noise Propagation.....	3-29
	Underwater Ambient Noise Conditions .....	3-30
3.8.2	PSS Ocean Test Locations .....	3-31
3.8.2.1	Proposed PSS Ocean Test Location.....	3-31
	Ambient Noise.....	3-31
	Transmission Loss .....	3-31
3.9	CULTURAL RESOURCES.....	3-31
3.9.1	Background .....	3-31
	Research Methodology.....	3-32
	3.9.1.1 Regional Southern California History.....	3-33
	Offshore.....	3-33
	Onshore.....	3-33
3.9.2	PSS Ocean Test Location.....	3-34
3.9.2.1	Proposed PSS Ocean Test Location.....	3-34
3.10	SAFETY AND ENVIRONMENTAL HEALTH.....	3-34
3.10.1	Background .....	3-34
3.10.2	PSS Ocean Test Locations .....	3-34
	3.10.2.1 Proposed PSS Ocean Test Location.....	3-34
<b>4</b>	<b>ENVIRONMENTAL CONSEQUENCES.....</b>	<b>4-1</b>
4.1	GEOLOGY, TOPOGRAPHY, AND SOILS .....	4-1
4.1.1	PSS Ocean Test Location.....	4-1
4.2	AIR QUALITY .....	4-1
4.2.1	Approach to Analysis .....	4-1
	Clean Air Act (CAA) General Conformity Analysis .....	4-1
4.2.2	PSS Ocean Test Location .....	4-2
	4.2.2.1 Proposed PSS Ocean Test Location.....	4-2
	Clean Air Act General Conformity Analysis .....	4-2
4.3	MARINE ENVIRONMENT .....	4-3
4.3.1	Approach to Analysis .....	4-3
4.3.2	PSS Ocean Test Location.....	4-3
	4.3.2.1 Proposed PSS Ocean Test Location.....	4-3
	Area outside California Coastal Zone Waters .....	4-3
	Water Quality.....	4-3
	Marine Sediments .....	4-3
	Area within California Coastal Zone Waters .....	4-3

## TABLE OF CONTENTS (Cont'd)

<u>CHAPTER</u>	<u>TITLE</u>	<u>PAGE</u>
4.4 MARINE BIOLOGY .....		4-4
4.4.1 Approach to Analysis .....		4-4
4.4.2 PSS Ocean Test Locations .....		4-4
4.4.2.1 Proposed PSS Ocean Test Location.....	.....	4-4
Area outside California Coastal Zone Waters.....	.....	4-4
Marine Flora .....	.....	4-4
Marine Fauna.....	.....	4-5
Impacts of Underwater Sound on Fish and Fisheries .....	.....	4-5
Threatened and Endangered Species .....	.....	4-6
Area within California Coastal Zone Waters .....	.....	4-6
4.5 MARINE MAMMALS .....		4-6
4.5.1 Approach to Analysis .....		4-6
4.5.2 Acoustic Sources.....	.....	4-8
Potential Impacts from the Moored Source.....	.....	4-8
4.5.2.1 Masking Effects.....	.....	4-11
4.5.2.2 Disturbance Impacts.....	.....	4-11
Disturbance to Mysticetes (Baleen Whales) .....	.....	4-11
Disturbance to Odontocetes (Toothed Whales) .....	.....	4-12
Disturbance to Pinnipeds (Seals and Sea Lions) .....	.....	4-12
Summary of Potential Disturbance Impacts .....	.....	4-13
4.5.2.3 Hearing Damage.....	.....	4-13
4.5.2.4 Summary of Potential Acoustic Impacts .....	.....	4-14
Area outside California Coastal Zone Waters .....	.....	4-15
Area within California Coastal Zone Waters .....	.....	4-15
4.5.2.5 Mitigation Measures for Acoustic Issues.....	.....	4-15
4.5.3 Attraction, Collision, Entanglement, and Ingestion Issues .....	.....	4-16
4.5.3.1 Attraction and Collisions .....	.....	4-16
Area outside California Coastal Zone Waters.....	.....	4-17
Area inside California Coastal Zone Waters.....	.....	4-17
4.5.3.2 Entanglement and Ingestion .....	.....	4-17
Area outside California Coastal Zone Waters.....	.....	4-17
Area inside California Coastal Zone Waters.....	.....	4-18
4.5.4 Chemical Contamination Issues .....		4-18
4.5.5 Potential for Marine Mammal Take .....		4-18
4.5.5.1 Threatened and Endangered Marine Mammals .....	.....	4-18
4.6 TERRESTRIAL BIOLOGY.....		4-19
4.6.1 Approach to Analysis .....		4-19
4.6.2 PSS Ocean Test Locations .....		4-19
4.6.2.1 Proposed PSS Ocean Test Location.....	.....	4-19
Area outside California Coastal Zone Waters.....	.....	4-19
Area within California Coastal Zone Waters .....	.....	4-19
4.7 LAND, USE, TRANSPORTATION, AND RECREATION.....		4-19
4.7.1 Approach to Analysis .....		4-19
4.7.2 PSS Ocean Test Location.....		4-20
4.7.2.1 Proposed PSS Ocean Test Location.....	.....	4-20
Area outside California Coastal Zone Waters.....	.....	4-20
Recreation .....	.....	4-20
Transportation.....	.....	4-20

## TABLE OF CONTENTS (Cont'd)

<u>CHAPTER</u>	<u>TITLE</u>	<u>PAGE</u>
	Area within California Coastal Zone Waters .....	4-20
	Land Use .....	4-20
	Recreation .....	4-20
	Transportation.....	4-20
4.8	SOCIOECONOMICS.....	4-21
4.8.1	Approach to Analysis .....	4-21
4.8.2	PSS Ocean Test Locations .....	4-21
	4.8.2.1 Proposed PSS Ocean Test Location .....	4-21
	Area outside California Coastal Zone Waters.....	4-21
	Area within California Coastal Zone Waters .....	4-21
4.9	NOISE .....	4-22
4.9.1	Approach to Analysis .....	4-22
4.9.2	PSS Ocean Test Locations .....	4-22
	4.9.2.1 Proposed PSS Ocean Test Location .....	4-22
	Area outside California Coastal Zone Waters.....	4-22
	Airborne Noise Environment.....	4-22
	Area within California Coastal Zone Waters .....	4-22
4.10	CULTURAL RESOURCES.....	4-22
4.10.1	Approach to Analysis .....	4-22
4.10.2	PSS Ocean Test Location.....	4-23
	4.10.2.1 Proposed PSS Ocean Test Location .....	4-23
	Area outside California Coastal Zone Waters.....	4-23
	Area within California Coastal Zone Waters .....	4-23
4.11	SAFETY AND ENVIRONMENTAL HEALTH.....	4-23
4.11.1	Approach to Analysis .....	4-23
4.11.2	PSS Ocean Test Location .....	4-24
	4.11.2.1 Proposed PSS Ocean Test Location .....	4-24
	Area outside California Coastal Zone Waters.....	4-24
	Area within California Coastal Zone Waters .....	4-24
4.12	NO-ACTION ALTERNATIVE .....	4-25
4.13	MEANS TO MITIGATE ADVERSE ENVIRONMENTAL IMPACTS .....	4-25
	Marine Mammals .....	4-25
	Threatened and Endangered Terrestrial Species .....	4-26
4.14	ENVIRONMENTAL IMPACTS THAT CANNOT BE AVOIDED .....	4-26
<b>5</b>	<b>CUMULATIVE IMPACTS.....</b>	<b>5-1</b>
<b>6</b>	<b>POSSIBLE CONFLICTS BETWEEN THE ACTION AND THE OBJECTIVES OF FEDERAL, REGIONAL, STATE, AND LOCAL PLANS, POLICIES, AND CONTROLS.....</b>	<b>6-1</b>
<b>7</b>	<b>ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL OF THE PROPOSED ACTION AND ALTERNATIVES.....</b>	<b>7-1</b>
	7.1 PROPOSED ACTION .....	7-1
	7.2 NO-ACTION ALTERNATIVE .....	7-1
<b>8</b>	<b>IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES .....</b>	<b>8-1</b>
<b>9</b>	<b>RELATIONSHIP BETWEEN SHORT-TERM ENVIRONMENTAL IMPACTS AND LONG-TERM PRODUCTIVITY .....</b>	<b>9-1</b>

## TABLE OF CONTENTS (Cont'd)

<u>CHAPTER</u>	<u>TITLE</u>	<u>PAGE</u>
<b>10</b>	<b>LIST OF PERSONNEL AND AGENCIES CONTACTED.....</b>	<b>10-1</b>
<b>11</b>	<b>REFERENCES.....</b>	<b>11-1</b>
<b>12</b>	<b>LIST OF PREPARERS.....</b>	<b>12-1</b>
<b>APPENDIX A</b>	<b>NATIONAL MARINE FISHERIES SERVICE (NMFS).....</b>	<b>A-1</b>
<b>APPENDIX B</b>	<b>SAN DIEGO AIR POLLUTION CONTROL DISTRICT (SDAPCD) RECORD OF NON-APPLICABILITY (RONA) and AIR EMISSIONS CALCULATIONS .....</b>	<b>B-1</b>
<b>APPENDIX C</b>	<b>CALIFORNIA COASTAL COMMISSION CONCURRENCE .....</b>	<b>C-1</b>
<b>APPENDIX D</b>	<b>ACRONYM LIST .....</b>	<b>D-1</b>

## LIST OF FIGURES

<u>NUMBER</u>	<u>TITLE</u>	<u>PAGE</u>
2-1	System Concept .....	2-3
2-2	Typical Deployment for Ocean Test.....	2-4
2-3	PSS Acoustic Signature .....	2-5
2-4	Approximate Location of Proposed PSS Ocean Test.....	2-8
3-1	Bathymetry of the Southern California Bight .....	3-5
3-2	MCB Camp Pendleton Historic Kelp Beds and Location of California Department of Fish and Game Artificial Reefs .....	3-7
3-3	Right Whale Sightings Within the Southern California Bight .....	3-12
3-4	Pinnipeds of the Channel Islands.....	3-13
3-5	Underwater Audiograms of Odontocetes .....	3-18
4-1	Estimated 175 dB 1 $\mu\text{Pa}^2$ –sec Zones of Ensonification.....	4-9

## LIST OF TABLES

<u>NUMBER</u>	<u>TITLE</u>	
<u>PAGE</u>		
ES-1	Summary of PSS Ocean Tests .....	ES-1
ES-2	Predicted Received Energy Source Levels Relative to Distance from Sound Source .....	ES-5
ES-3	Mitigation Measures for Marine Mammals during PSS Ocean Test Acoustic Transmissions ....	ES-5
ES-4	Impact Summary Matrix .....	ES-8
2-1	Summary of PSS Ocean Test.....	2-2
2-2	Proposed PSS Ocean Test Operational Criteria .....	2-6
2-3	Comparison of West Coast Ocean Test Sites/Operational Criteria.....	2-7
3-1	California and National Ambient Air Quality Standards .....	3-2
3-2	Federal and State Attainment Status for San Diego Air Pollution Control District.....	3-3
3-3	Marine Mammals Common to Waters Offshore California .....	3-10
3-4	Pinniped Breeding, Molting, and Feeding Cycle in the SCB .....	3-13
3-5	Regional Commercial Fishing Poundage and Value (1995) .....	3-26
3-6	Commercially Fished Species within Southern California.....	3-26
3-7	Fish Caught by California Recreational Passenger Fishing Fleets (1990 and 1991) .....	3-27
3-8	Typical Natural Underwater Noise Sources and Levels.....	3-30
3-9	Typical Man-Made Underwater Noise Sources and Levels .....	3-30
4-1	Applicable <i>de minimis</i> Levels for Affected Air Basins (tons/year) .....	4-1
4-2	Summary of Total Emissions from Proposed PSS Ocean Tests.....	4-2
4-3	Hearing Thresholds (in dB re 1 $\mu$ Pa) for Various Species of Fish.....	4-6
4-4	Estimates of Marine Mammals within Acoustic Harassment Area for Summer & Fall .....	4-10
4-5	Potential Impacts of the PSS Acoustic Source on Marine Mammals.....	4-15
4-6	Mitigation Measures for Marine Mammals during PSS Ocean test Acoustic Transmissions .....	4-16
6-1	Possible Conflicts Between the Action and the Objectives of Federal, State, and Local Land Use Plans, Policies, and Controls .....	6-1